Autonics



Photoelectric Sensors with Synchronous Detection

BY Series

PRODUCT MANUAL

Be sure to follow the instructions and precautions in the instruction manual, other manuals, and the Autonics website.
The specifications, dimensions, and other information in this document are subject to change without notice for product improvement.
Certain models may be discontinued without notice.

Safety Precautions

- 'Safety Precautions' are provided to ensure safe and proper use of the product and to prevent accidents or hazards. Please make sure to follow them carefully.
- ⚠ symbol indicates a caution, warning of potential hazards under certain conditions.

⚠ Warning Failure to follow instructions may result in serious injury or death.

01. Fail-safe device must be installed when using the product in applications that may cause serious injuries or property loss. (E.g. nuclear control systems, medical equipment, ships, vehicles, railroads, aircraft, combustion devices, safety devices, security systems, disaster prevention devices, etc.)
Failure to do so may result in personal injury, property loss or fire.

02. Do not use or store the product in environments containing flammable, explosive, or corrosive gases, or in places exposed to high humidity, direct sunlight, radiant heat, vibration, shock, or salt.
Failure to do so may result in explosion or fire.

03. Do not disassemble, repair, or modify the product without authorization.
Failure to do so may result in fire.

04. Do not connect, repair, or inspect the product while connected to a power source.
Failure to do so may result in fire.

05. Check the connection diagram before wiring.
Failure to do so may result in fire.

⚠ Caution Failure to follow instructions may result in injury or product damage.

01. Use the product within its rated specifications and performance limits.
Failure to do so may result in fire or product damage.

02. Use a dry cloth to clean the product. Do not use water or organic solvents.
Failure to do so may result in fire.

Cautions During Use

- Make sure to follow the instructions in 'Cautions During Use'. Failure to do so may result in unexpected accidents.
- When connecting inductive loads such as DC relays or solenoid valves use a diode, varistor, or similar component to suppress surges.
- Wait at least 0.5 seconds after applying power before using the product. When using separate power supplies for sensor and load, apply power to the sensor first.
- Power input should be supplied from an isolated and limited voltage/current source, or from a Class 2 or SELV power supply.
- To prevent surges and inductive noise, separate the wiring from high-voltage and power lines, and keep wiring lengths as short as possible.
- When supplying power with an SMPS, ground the F.G. terminal and connect a noise suppression capacitor between the 0 V and F.G. terminals.
- When using the product with noise-generating devices (e.g. switching regulators, inverters, servo motors, etc.), make sure to ground the F.G. terminal of the unit.
- This product may be used in the following environmental conditions.
  - Indoors (UL Type 1 Enclosure)
  - Altitude: up to 2,000 m
  - Pollution Degree 3
  - Installation Category II

Product Components

- Emitter × 1, Receiver × 1
- Bracket × 2
- Instruction manual
- M3 bolt × 4, M3 nut × 4

Ordering Information

This is only for reference, the actual product does not support all combinations.
For selecting the specified model, follow the Autonics website.

BY	❶	❷	-	❸	❹	❺	❻	-	❼

❶ Sensing direction
No mark: Front
S: Side

❷ Sensing distance
500: 500 mm

❸ Sensing type
T: Through-beam

❹ Power supply
D: 12 - 24 VDC

❺ Output
T: Solid state (transistor)

❻ Through-beam Emitter/Receiver 01)
1: Emitter
2: Receiver

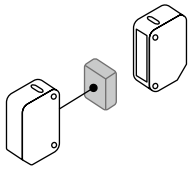
❼ Connection
No mark: Cable type

01) This model name is for through-beam photoelectric sensor management only and is not required when placing an order.

Cautions During Installation

- Be sure to install this product by following the usage environment, location, and specified ratings. Consider the listed conditions below.
  - Installation environment and background (reflected light)
  - Sensing distance and sensing target
  - Direction of target's movement
  - Characteristic curves
- When installing multiple sensors closely, it may result in malfunction due to mutual interference.
- For installation, tighten the screw with a torque of 0.3 N m. Mount the brackets correctly to prevent the twisting of the sensor's optical axis.
- Do not impact with a hard object or bend the cable excessively. That could decrease the product's water resistance.
- Use this product after the test. Check whether the indicator works appropriately for the positions of the detectable object.

Through-beam



Emitter - Receiver:
Install to face each other

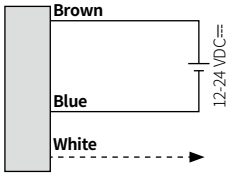
Operation Timing Chart and Indicators

	Dark ON	
Received light	Received Interrupted	
Operation indicator (red)	ON OFF	
Transistor output	ON OFF	

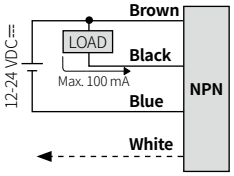
Connections

- Be sure to use the same power for the emitter and receiver.
- Be sure to connect the synchronous wire (white) of the emitter and receiver.

■ Emitter

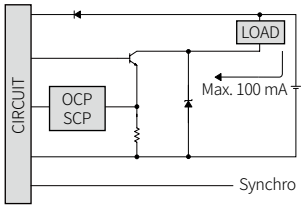


■ Receiver



Circuit

■ NPN open collector output



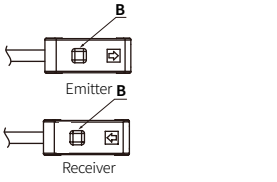
- OCP (over current protection), SCP (short circuit protection)
- If short-circuit the control output terminal or supply current over the rated specification, normal control signal is not output due to the protection circuit.

Dimensions

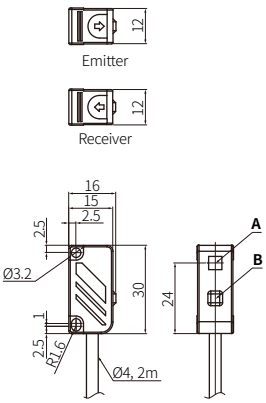
- Unit: mm, For the detailed drawings, follow the Autonics website.

A	Optical axis
B	Operation indicator (red)

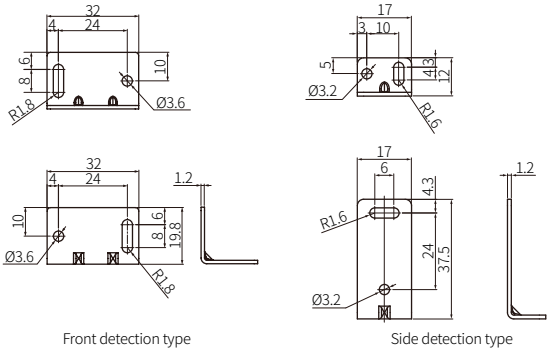
■ Front detection type



■ Side detection type



■ Bracket



Front detection type

Side detection type

Specifications

Model	BY□500-TDT-□
Sensing type	Through-beam
Sensing distance	500 mm
Sensing target	Opaque materials
Min. sensing target	≥ Ø 5 mm
Response time	≤ 1 ms
Light source	Infrared
Peak emission wavelength	940 nm
Operation mode	Dark ON mode
Indicator	Operation indicator (red)
Certifications	cULus, RoHS, EAC
Unit weight (packaged)	≈ 150 g (≈ 200 g)

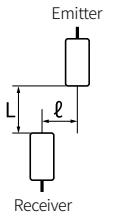
Power supply	12-24 VDC⎓ ±10% (ripple P-P: ≤ 10%)
Current consumption	Emitter: ≤ 30 mA, receiver: ≤ 30 mA
Control output	NPN open collector output
Load voltage	≤ 26.4 VDC⎓
Load current	≤ 100 mA
Residual voltage	≤ 1 VDC⎓
Protection circuit	Reverse power protection circuit, output short overcurrent protection circuit
Insulation resistance	≥ 20 MΩ (500 VDC⎓ megger)
Noise immunity	±240 VDC⎓ the square wave noise (pulse width: 1 μs) by the noise simulator
Dielectric strength	Between the charging part and the case: 1,000 VAC~ 50/60 Hz for 1 min
Vibration	1.5 mm double amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 2 hours
Shock	500 m/s^2 (≈ 50 G) in each X, Y, Z direction for 3 times
Ambient illuminance (receiver)	Sunlight: ≤ 11,000 lx, incandescent lamp: ≤ 3,000 lx
Ambient temperature	-10 to 60 °C, storage: -25 to 70 °C (no freezing or condensation)
Ambient humidity	35 to 85 %RH, storage: 35 to 85 %RH (no freezing or condensation)
Protection rating	IP50 (IEC standard)
Connection	Cable type
Cable specification	Ø 4 mm, 4-wire (Emitter: 3-wire), 2 m
Wire specification	AWG26 (0.52 mm, 20-core), insulator outer diameter: Ø 1 mm
Material	Case: PC, sensing part: PC, bracket: SPCC, bolt: SCM, nut: SCM

Product Characteristics

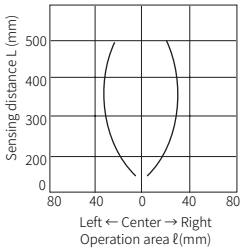
This data is based on internal testing and for reference only. Performance may vary by installation and usage environment. Product testing prior to use is recommended.

Through-Beam Type (TYPICAL)

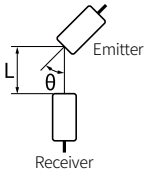
■ Detection Area



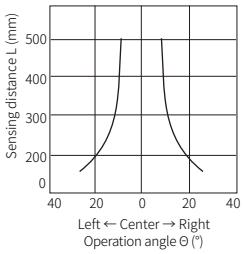
• BY500-TDT



■ Emitter Angle



• BY500-TDT



18, Bansong-ro 513Beon-gil, Haeundae-gu, Busan, Republic of Korea, 48002
www.autonics.com | +82-2-2048-1577 | sales@autonics.com